UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING
WASHINGTON, D. C.

FIELD LETTER FOR OCTOBER

November 1, 1915. No. 9

DIVISION OF CONSTRUCTION
Vernon M. Peirce, Chief.

General

V. M. Peirce, Chief, left Washington October 21 to inspect the Ohio and Iowa Post Roads, and certain types of road construction at Paris, Illinois, Iola, Kansas, and Scranton, Pennsylvania. He expects to return to the Office about November 4.

Hereafter reels for 100-foot steel tapes will not be furnished to engineers of this Division as the reels cost practically as much as the tapes and are of little practical value. Tapes to be sent in to the Office should be cleaned and oiled, rolled into a circle about 8 inches in diameter and securely tied. To get them into a circle it is preferred they be collected in the hand in 5 foot lengths in the form of the figure 8 and then cast into a circle. It is desired that those engineers who have not been using this method acquaint themselves with it.

Projects:

Object-Lesson Roads

On October 18, J. H. Dodge, S.R.C., completed repairs on the object-lesson road at Falls City, Nebraska, which was constructed in 1911, and badly damaged by overflows. He has been assigned to cooperate with the local officials of Pawnee County, Oklahoma, in building a sand-clay road.

Chas. T. Harrison, S.R.C., who was assigned to Heber Springs, Arkansas, found that sufficient funds were not available to build a road of a length to properly demonstrate proper methods of construction. He remained in the county about 15 days, during which time he inspected a number of roads with the local officials and gave them advice and information relative to their various road problems. When this assignement was completed Mr. Harrison was transferred to the Division of Economics to assist at some of the road model exhibits.

Post Roads

The post roads at Loudon, Tennessee, and Clarksville, Tennessee are completed and very excellent final reports have been received. J. A. Whittaker, S.R.E., who was in charge of the Clarksville project, will now devote his entire time to assisting the Kentucky State Highway Department in its state aid work. His headquarters will be at Hopkinsville. M. E. Worrell, H.E., in charge of the Loudon project, has been assigned to assist the county authorities of Pickett County, Tennessee, in planning the improvement of a system of roads for their county from a recent bond issue of $50,000.

W. H. Rhodes, H.E., has reported to the Office to prepare a bulletin on gravel roads, and Percy Rideout, J.H.E., is now in charge of the North Carolina (Old Fort Township) post road with headquarters at Biltmore.

The section of the Texas post road in Hays County has been completed, and on November 1, R. H. Harrison, J.H.E., will relieve W. E. Rosengarten, H.E., who is in charge of the section in Comal County. Mr. Rosengarten will then be transferred to the Division of Economics to continue economic studies of the post roads.

Advice and Inspection

The proposed trip of inspection of a road from San Diego, California, to Washington, D. C., by the Southern National Roads Association has been delayed. Meanwhile B. H. Burrell, S.H.E., who has been assigned to accompany representatives of the association on this trip, delivered a series of lectures at North Bend, Ore., and has been making a study of the road system of Los Angeles County for the Division of Economics.

W. A. Crossland is planning and estimating the cost of a system of roads to be improved by a bond issue in Fayette County, Texas.

F. A. Davis, J.H.E., will complete his report on a system of roads for Lincoln Parish, Louisiana, shortly, and will then be on leave until November 15.

J. D. Fauntleroy, S.H.E., is planning a system of roads which Brooke County, West Virginia, proposes to improve through proceeds of a bond issue.

W. H. Lynch, S.H.E., has completed his assignment at Rockport, Indiana, and has been assigned to cooperate with the Polk County, Florida, authorities in planning a system of roads to be improved from a bond issue of about $1,000,000.

On October 27, R. E. Toms, S.H.E., completed an inspection of the proposed routes for the Jackson Highway from Nashville, Tennessee, to New Orleans. He will now devote his entire time to assisting the Kentucky Highway Department with its state aid work. His headquarters are at Mt. Sterling, Kentucky.

J. C. Wonders, S.H.E., is making a study of the roads of Saline County, Mo., for the purpose of preparing a report recommending a system of roads for the county, and the best method for improving these roads.

During the early part of October, C. H. Moorefield, S.H.E., inspected the roads of Lapeer County, Michigan, in cooperation with a representative of the State Highway Department. He prepared a report recommending the adoption of a certain system of roads, the best method of improvement, and a plan for financing the work.

Field Experiments

Work has progressed very satisfactorily on the experimental roads in Alexandria County, Virginia, the work of surfacing having been practically completed on Mt. Vernon Avenue.

Survey and plans were completed and contracts let for building an experimental gravel road from near Gum Spring on the Virginia Post Road to Mt. Vernon, a distance of about $2\frac{1}{4}$ miles. It is planned to build the road this fall and next summer to conduct a series of experiments in surface treating it with bituminous materials. J. H. Eldridge, S.R.C., is in charge of the construction assisted by A. S. Hathaway, J.H.E.

Bridges and Culverts

O. L. Grover, In Charge.

Designs were prepared for 3 additional wooden bridges to be built over the drainage canals of the Mattamuskeet Drainage District, Hyde County, North Carolina. The plans for the bridges for the Manatee County, Florida, road project were completed.

Considerable work was done on the preparation of standards for small bridges and culverts, and studies were made on a revision of specifications for bridges.

O. L. Grover left on the twenty-third for Maine, where he will superintend the investigation of foundation conditions preliminary to the design of a large bridge near Southport.

The extra blueprint machine and the new washer and drier for the blueprint work have been installed. As a consequence of this very efficient equipment, the blueprint work for the entire Department will now be done by this Office.

DIVISION OF ROAD MAINTENANCE
E. W. James, Chief.

Projects:

Advice, Inspection, and Lectures

V. E. Towles, H.E., who has been assisting D. H. Winslow, S.R.C., on maintenance work in Granville County, near Oxford, N. C., has gone to Mecklenburg County to remedy the "low ground section near Clarksville, Virginia."

D. H. Winslow, S.R.C., delivered an address at Kenbridge, Virginia, October 3, and gave a short talk at Halifax, N. C., October 4.

Geo. C. Scales, S.H.E., has been asked to deliver an address November 17 before the Convention of County Commissioners of Georgia, and his subject will be "Road Maintenance."

E. W. James, Chief, inspected the Kentucky, Mississippi, and Tennessee Post Roads from October 7 to 15 inclusive, and visited the State Commissions and officials with a view to making arrangements for systematic maintenance on those post roads. Cost data and systematic traffic records will be kept similar to that on the experimental roads near Washington.

W. A. Ricketts was appointed patrolman of the Maryland Post Road, October 1, and is cleaning out ditches and culverts, as the surface treatment of this road is now completed. The shoulders will be dressed during the early part of next month, as a road grader has been hired for this work. S. Leroy Taylor, H.E., has charge of maintenance of this road and that of the Rockville Pike.

Washington-Atlanta Highway

D. H. Winslow reports that 10,000 square yards of Tarrenite, was completed in Wake County, North Carolina, from the city limits toward Cary. Work was also begun on relocation near Method, abolishing two railroad crossings.

Two miles of grading in Durham County and one and one-half miles of surfacing have been completed on the Leesville Road, and five miles of the old macadam road from the Durham city limits east will be redressed at a very early date.

In Harnett County work was begun at the Johnston County line on relocation and construction of five miles of road to the city limits of Dunn.

Clayton Township in Johnston County will return to the patrol system of maintenance after trying the squad system. Smithfield Township's new board has been organized and is ready for maintenance work.

All toll gates and bridges on the Washington-Atlanta Highway in North Carolina have been abolished and only one ford is now left.

Work on Black Creek Bridge, Chesterfield County, S. C., was begun October 6, under supervision of W. L. Spoon, S.H.E. The fills at Lynches River have been clayed and graveled. In a trip over the Central Division, Mr. Spoon reports that he found the Lexington Road in very good condition, and convicts at work on the worst section near Augusta, Georgia.

Field Experiments

Section 6 of the Rockville Pike is to be retreated with oil and top-dressed with gravel. The contract was awarded to the Good Roads Company of Baltimore, and D. G. Haire, S.R.C., will have charge of it.

A considerable amount of patch work has been done on Section 1 of the pike.

New Projects.

The chief of the Division is on itinerary in the State of Florida, endeavoring to complete arrangements, if possible, for placing the maintenance of the road between Brooksville and St. Petersburg under Government supervision.

DIVISION OF NATIONAL PARK AND FOREST ROADS
T. Warren Allen, Chief.

Projects:

Inspection

During October, Mr. Allen visited the engineers in Districts 2 and 5, and inspected a number of roads in California.

U. S. Forest Roads

In District No. 2, A. E. Palen, H.E., in charge, work was continued on the Rabbitt Ear road in the Routt National Forest, Colorado; on the Buffalo-Hazelton road in the Big Horn National Forest, Wyoming; and on the Hot Springs-Deadwood road in the Black Hills, South Dakota.

Mr. Palen made a reconnaissance survey of proposed road relocations and improvements across the Minnesota National Forest, and inspected the site of the Cass Lake Bridge and a bridge which it is proposed to construct across the Mississippi River at Ball Club. He went to St. Paul, Minnesota, to consult with the State Highway Commission and the U. S. Army Engineer regarding the Cass Lake Bridge, and visited the offices of the Great Northern Railway to obtain data on their bridges which parallel the proposed bridges in the Minnesota National Forest.

In District No. 3 work was continued on the Red River road between Elizabethtown (E'town) and Red River, in New Mexico. The force of men and teams were increased on this road in order to get the road open before winter weather set in. O. N. Powell, U. S. Highway Engineer, who is in charge in this district, delivered an illustrated lecture on road building before the state road convention, which was held at Flagstaff, Arizona, October 9. He also conferred with officials and inspected plans for the toll road from Flagstaff to San Francisco, California.

In District No. 4, construction on the Kamas-Stockmore road, Uinta National Forest, consisted in completing the seven and one-half miles of road along the south fork of the Provo River. This completes the season's work on this road. On the Logan-Garden City Road, Cache National Forest, work was completed on the fourth mile of the road, which lies in Cache County. This road opens an

excellent route for automobile traffic to Bear Lake by way of Logan Canyon. On the Payette River Road, Payette National Forest, Idaho, construction was resumed on the section from Pine Flat to Deadwood River, and work commenced on the abutments for a 65-foot steel bridge across the Deadwood River. On the Teton Pass Road, Teton National Forest, Wyoming, work has been suspended. On the Secret Pass Road a small crew is at work principally on birdges. In the Powell National Forest work has been resumed on the last three-mile section of the Escalante-Windor Road, which it is hoped to complete before the end of the season. Three survey parties are at work in various parts of the district on next season's work. Between October 15 and 23, C. H. Kendall, S.H.E., who is in charge of this district, delivered a series of lectures on road construction in towns through the Yakima Valley, Washington. Mr. Kendall also advised with county officials and investigated proposed routes across the Manti National Forest in Utah.

In Distridt No. 5, C. C. Morris, H.E., in charge, construction work on the Trinity River Road, Trinity National Forest, California, is still being held up by the necessity for condemnation proceedings on some of the right-of-way required. A contract for clearing will be let a little later and it is expected that this work will be completed by the time construction work may be started next spring. Projects in the southern part of the State were investigated, and survey parties will later be put at work upon two of these projects, one in the vicinity of San Diego and the other near Pasadena.

In District No. 6, B. J. Finch, S.H.E., in charge, work was resumed in Washington on the Little White Salmon Road, Columbia National Forest, and brought to a close in Oregon on the Alsea River Road. One survey party was engaged on a survey of the McKensie River Road, Cascade National Forest, in preparation for construction work to be done next year. Another party in charge of J. T. Schuyler, S.H.E., continued and brought to conclusion the Government Camp-Mount Hood Road survey in the Oregon National Forest.

National Park Roads

The only work being done in this section is that by T. C. Peterson, J.H.E., who is located in Glacier Park and preparing plans for a proposed road around Lake McDonald. Mr. Peterson will soon proceed to Portland where he will be engaged during the winter completing Yosemite Park and Glacier Park road plans.

County Work

Skamania County, Washington, J. W. Ball, J.H.E., in charge.

Plans were completed for the first nine-mile section of the North Bank Columbia River Road. Bids asked for to build this section were opened October 23, and contract awarded to J. M. Ambrose for $48,000.50. It is now expected that plans will be completed on the remainder of the line so that contracts may be arranged for about the middle of December. The total length which will be put under construction is about 40 miles, and the type of road which will be used is earth.

On the 27th of the month the chief of the division visited Ellensburg, Washington, and addressed a meeting held by the Washington State Good Roads Association.

DIVISION OF ROAD MATERIAL TESTS AND RESEARCH
Prevost Hubbard, Chief.

Projects:

Administration

During October, while on an extensive tour of the Western states, Mr. Hubbard visited Portland, Tacoma, Seattle, and inspected the various types of municipal, county, and State highways in the vicinity of those cities. The improved rural highways in this section are largely confined to Portland cement concrete and Warrenite pavement, which latter has apparently given less satisfaction in the State of Washington than in Oregon. This type of pavement is being mainly used on the Columbia River highway in the vicinity of Portland, with the exception of certain five per cent grades, where hillside brick are to be used.

Upon his return East, Mr. Hubbard stopped at Chicago to inspect a tar refinery of the Barrett Manufacturing Company, the largest and most modern tar refinery in the country.

Routine Tests and Analyses.

About 50 samples of bituminous material were examined during October.

Over 100 samples of rock, slag, cement, etc., were examined in the Physical Testing Laboratory, and 114 samples of rock, slag, etc., were classified in the Microscopic Laboratory.

Research Upon the Properties of Dust Preventives and Road Binders.

Now that the summer construction period is drawing to a close, it is expected that the volume of routine work, which has been unusually heavy, will decrease, and offer opportunity for vigorously pushing research along this line.

Early in October the housing for a small refining plant was completed at the Arlington Experimental Farm. Plans are being perfected toward the installation of a complete equipment to experimentally distill and refine all types of bituminous materials. During the winter, a continuation of the investigation upon the relative binding value of various bituminous materials with different types of rock dust, is contemplated.

Considerable preliminary work has been done in a study of bituminous materials utilizing the ultra-microscope.

Experimental Bituminous Road Construction and Maintenance.

During the latter part of October, Messrs. Hubbard and Reeve made an inspection trip into the southern part of Virginia, for the purpose of studying topsoil roads, with reference to the possibility of their construction, treatment, and maintenance with bituminous materials. But very little work along this line has been done as yet, and it is hoped that, as a result of laboratory investigations of samples which were taken, plans may be perfected during the winter for conducting a number of experiments upon topsoil roads next spring.

Non-bituminous Road Materials Investigations.

During the month considerable work has been done relative to determining what relation exists between the tensile strength of briquettes made with various concrete sands.

Work has also been started with a view to determining the relation between the toughness of, and percentage of cement in, Portland cement mortars. This study is being conducted upon specimens which are tested in the impact machine. The Physical Testing Laboratory has also been engaged in the compilation of the results of rock tests, which will be published as a bulletin shortly after January 1, 1916.

Standardization of Methods of Testing

The work upon a new standard penetration needle, and also upon the effect of several variants upon the penetration test, is about completed, and the results will shortly be in shape for publication. Work on the development of an improved method for determining fixed carbon is being continued, with some promise of successful completion. It is expected that the revision of Bulletin No. 38, "Methods for the Examination of Bituminous Road Materials," will be issued at an early date. A revision of that portion of Bulletin 44 dealing with the testing of road building rock has been completed and sent to the printer. Work has been pushed upon the development of a mechanical method for determining the per cent of clay in road gravel, and also upon an abrasion test for gravel. Various devices for determining the apparent specific gravity of rock are also being investigated. A bulletin on the "Relation of Mineral Composition and Rock Structure to the Physical Properties of Road Materials" has been sent to the printer. This is a revision of Bulletin 37, by Dr. Lord.

Concrete Investigations

In the Concrete Investigation Laboratory at Arlington tests are being conducted on reinforced concrete slabs under concentrated loads. A slab of 6 inches effective depth, 32 feet in width, with a 16-foot span, is now ready for loading. The work along this line will be pushed to completion as rapidly as possible, by supplementing the large slab tests with tests upon smaller slabs of more convenient size.

Tests are under way to determine the effect of long-time loads upon the "flow" of plain and reinforced concrete. Special loading apparatus has been built for this purpose, and special specimens have been molded.

The effect of varying length of time of mixing upon the strength of concrete is also being studied with the idea in view of determining the economy of increasing the time of mixing, or varying the method of mixing ordinarily used.

Plans are being matured for a study of the distribution of pressures through earth fills. It is believed that this is an important problem, in view of the widely variant assumptions now being made by bridge designers throughout the country upon the distribution of wheel and roller loads to bridge floors.

DIVISION OF ROAD ECONOMICS
J. E. Pennybacker, Chief.

Projects:

Statistical Investigations

The assembling of statistics on road mileage, revenues, and expenditures is complete for over 1,800 counties out of a total of 2,999 for the entire United States. A collaborator has been appointed for Pennsylvania but no data have, as yet, been collected.

Experimental Convict Camp

The work in the establishment of the convict camp in Fulton County, Georgia, is progressing. The portable camp buildings which will house the convicts are nearing completion and will soon be ready for installation on the grounds.

J. E. Pennybacker was in Atlanta, October 25-27, conferring with officials in regard to the convict camp. H. S. Fairbank, H.E., during the last ten days visited New Orleans and Baton Rouge, Louisiana, and Jackson and Parchman, Mississippi, conferring with prison officials and studying state and county systems of convict labor.

Road Management Studies

A. S. Brainard, S.H.E., accompanied by B. L. Vipond, is making a road management study of Baltimore County, Maryland. J. J. Tobin, A.R.E., has made a study in Hinds County, Mississippi, and is now making a study of Forest County, Mississippi. He is to select two counties in Alabama for similar studies. R. F. Easthar, H.E., made a road management study in Mecklenburg County, North Carolina.

Road Material Freight Rates

The work of tabulating railroad freight rates on road-building material is being continued. As a result of negotiations conducted by this Office, the Southern Railway has made considerable reductions in freight rates on road material consigned to State and county officials and has established a uniform basis for all its territory. It has also greatly improved and simplified its classification by placing crushed stone, gravel, sand, chert, slag, and shell in a single class. Similar negotiations will be conducted with other railroad companies.

Lectures and Road Models

Road models were exhibited by J. J. Tobin at the Tri-State Fair at Memphis, Tennessee, September 26 to October 5, and at the Mississippi-Alabama Fair, Meridian, Mississippi, October 18-23.

Mr. Tobin was relieved at Meridian by Charles T. Harrison, S.R.C. Mr. Harrison shipped the models from Meridian to Jackson, Mississippi, where they were exhibited at the Mississippi State Fair, October 25-30. At the conclusion of the Fair at Jackson the models were shipped to the State Highway Department at Montgomery, Alabama, for display there for an indefinite period.

R. F. Easthar had charge of an exhibit of road models at the State Fair at Raleigh, North Carolina, October 18-23. From Raleigh these models were shipped to Live Oak, Florida, for exhibit in connection with the Suwanee County Fair, November 2-6. Charles T. Harrison will have charge of the exhibit at Live Oak.

A. S. Brainard had charge of an exhibit at the Copper County Fair, Houghton, Michigan, September 28 to October 2.

L. E. Boykin, A.R.E., had charge of a road model exhibit at the International Dry Farming Congress and Exposition at Denver, Colorado, September 27 to October 9.

Mr. Boykin addressed a meeting of farmers and citizens of the town of Washington, North Carolina, on the evening of October 27.

M. O. Eldridge, A.R.E., delivered an illustrated address on road maintenance at the annual convention of the Southern Appalachian Good Roads Association at Bluefield, West Virginia, on October 15.

County Economic Studies

M. O. Eldridge is now engaged in checking up and making a final report on the economic studies of the several counties selected for that purpose in the States of Florida, Alabama, Mississippi, Virginia, and New York. The results of this investigation are being prepared as a bulletin which it is hoped to have in the hands of the printer by January 1.

State Highway Department Studies

E. H. Barber, H.E., who has been on state highway department studies, has temporarily left the Office to take up special work in Massachusetts. He has completed his field studies in eleven states, and the project will be carried to completion by J. D. Fauntleroy, S.H.E.

Economic Studies of Post Roads

W. E. Rosengarten, H.E., has been assigned to make final economic studies and reports on post roads. He is beginning this assignment with the Texas Post Road, in Bexar, Hays, Guadalupe, and Comal Counties.

Library

The library has recently purchased the following new books:

Punjab Rivers and Works. E. S. Bellasis.
Use of Irrigation Water and Irrigation Practice, Vol. 1. B. A. Etcheverry.
Conservation of Water by Storage. George Fillmore Swain.
Law of Irrigation. Charles F. Davis.
The Examination of Hydrocarbon Oils. Prof. Dr. D. Holde.
Manual for Inspectors of Coal Oil. Chas. J. Tagliabue.
Practical Oil Geology. Dorsey Hager.
Coal Gas Residuals. Frederick H. Wagner.
Manual of Reinforced Concrete and Concrete-Block Construction. C. F. and Dunn W. Marsh.

DIVISION OF RURAL ENGINEERING
E. B. McCormick, Chief

Projects:

Domestic Water Supply and Drainage

Water Supply: Plans for hydropneumatic water-supply systems for farm uses are in progress, and study is being made of other systems.
Sewage Disposal: Plans have been completed for a sprinkling filter, for a septic tank, and for a subsurface drainage system for level lands.

Studies of the merits of two patented sewage disposal systems were made.

A 900-foot sewer connection for the Animal Husbandry Farm at Beltsville, Maryland, has been located and the grades established and set.

Power Development

Advice and preliminary inquiries regarding two projects have been made.

Farm Buildings

The corn-crib design mentioned last month has been finished and the plans are ready for distribution on request. It will shortly be described in the Department Weekly Newsletter.

Plans are being prepared for a 6-room farmhouse, and for a creamery and cheese factory which will be added to the list of stock plans of the Dairy Division.

A bulletin on the laying out of the farmstead is being prepared; it will discuss a single plan suited to a certain type of farming and certain section of the country. Another bulletin being prepared will compare an existing typical New England barn with the drawings of an improved type based on the layout of the existing barn.

The preparation of drawings of building plans and equipment, to be used in a bulletin by the Bureau of Animal Industry on sheep-raising, has been undertaken by this Office.

Problems Involving Mechanical Principles

An ever increasing volume of requests for information and advice under this comprehensive head is requiring the attention of this Division along the lines of electric plants for heating, light and power, ice and refrigerating plants, as well as heating plants for the home, the possibility of small water power plants for the farm, and a variety of questions coming under the head of internal combustion engines.

In the last Letter attention of field men was drawn to the urgent necessity of reporting on farm power plants which might be located in their respective fields of operation. No reports have been received, and it is again urged that they give their attention to this matter, because such reports will be of considerable service and benefit to all concerned.

Cooperative Work in Rural Engineering

Designs are complete for an apparatus to prevent explosions and fires, and for the extinguishing of fires, to be used in connection with the operation of grain separators. The apparatus will be built in the shops of this Office and tested out in the galleries used by the Bureau of Mines in Pittsburg in investigating mine explosions.

Field Experiments - Traction Tests

Elmer Johnson, A.M.E., completed the run with the dynamometer wagon at Old Fort, North Carolina, and shipped the wagon to Portland, Maine. He is now making the final run on the new road in that section. He reported to Washington with his records and data on his way north.

Compiling data for the final reports on the Iowa and Alabama post-roads is in progress, and the records taken by Mr. Johnson at Alexandria are receiving preliminary studies.

Final detailed and assembly drawings of the revised dynamometer wagon are being completed.

General

A. D. Morehouse, former drainage engineer of the Division of Drainage Investigations, has been detailed to this division to assist in the work.

SECTION OF ACCOUNTS

W. Carl Wyatt in Charge.

The request contained on page 16 of the Field Letter No. 8 for August and September for all field men to return to this Office immediately all of the old project report forms which are to be superseded by the new form commencing with the month of September, should have so qualified as to omit employees of Irrigation and Drainage Investigations, as this applied only to project report forms used by employees upon road projects. The monthly report form heretofore is use by employees of Irrigation and Drainage will not be changed.

On account of the consolidation which occurred July 1, the work of the Accounts Section of this Office was greatly increased, and it is now necessary that the accounts be segregated as fast as they are received in order that the most important accounts and the most urgent cases may have preferred attention. The reimbursement vouchers of field men are handled first, and for this reason the payment of form 5 vouchers has necessarily been delayed. Such form 5 vouchers, however, as are sent in by field men are given preference over those relating to purchases in Washington, and every effort is being made to expedite the payment of employees' salaries, reimbursement accounts, and form 5 vouchers covering purchases made or services rendered in the field. It is believed that the adoption of a field payroll, together with a classification of the vouchers as above set out will result in more prompt settlement of accounts hereafter than has been possible during the months of August and September.

In submitting vouchers employees of Irrigation and Drainage will please not write anything in the space provided to indicate appropriation from which payment should be made, as the Accounts Section is required to show in this space the official appropriation stamp.

All field employees of this Office are requested to read the article entitled, "Reimbursement Accounts" in the Departmental Circular No. 6 of Volume 1, dated October 10, 1915, which gives considerable information relative to the handling of reimbursement accounts by financial clerks and others in the Washington Office.

It is noted that a number of the employees of Irrigation and Drainage Investigations continue to use the small blue envelope issued by the Office of Experiment Stations Accounts Section for sending in duplicates of transportation requests, which occasions delay as these requests have to be forwarded to the

Office of Public Roads and Rural Engineering from the States Relation Service, and it is suggested that all such envelopes should be returned at once to the Accounts Section of the States Relation Service. No special envelope is required for sending in duplicates of transportation requests to this Office. They should, however, as heretofore, be sent in very promptly after the transportation request has been issued, in order that the proper record may be made. In this connection attention is called to the fact that duplicates of transportation requests are of no value to this Office unless there appears upon them the charge made by the railroad company for the service. A number of duplicates have been received recently which were almost illegible on account of lack of care in writing the original. If the duplicate is examined before it is mailed any portion of the writing that appears to be illegible can then be quickly and easily made plain.

It is also noted that requests continue to come in to the Property Clerk's office for "A supply" of certain articles needed, instead of the requisite number being stated, and attention is again called to the fact that if these orders can be made more exact it will facilitate the handling of this part of the work and result in greater satisfaction to employees in the field.

Paragraph 77 of the Fiscal Regulations requires that employees show the time of arrival at or departure from their different assignments. It is noticed in the examination of the accounts of the majority of the field men that this information is incomplete, in some instances no time of arrival or departure being shown, and in some merely the time of departure. This information is very necessary in order to properly check the per diem allowances, as without this information it becomes necessary to return the account of the claimant, thereby causing delay in payment.

Treasury Officials require that travel accounts be stated in progressive order and provide a comprehensive history of the period involved. Meals and lodging, transportation, etc., for which no charge is made, should be entered in the account in regular order with the notation "no charge." When claiming either regular or extra per diem (where such is authorized), the day and hour of beginning and ending travel, the first and last item of expense (berth, meal, or lodging) and where incurred, and the exact period or periods for which per diem is claimed must be clearly stated in the account in the manner shown on Pages 48 and 49 of the Fiscal Regulations.

The Solicitor of the Department in a recent opinion has held that under the law no laborers or temporary field employees may be employed for labor over eight hours per day. In the future no account for employment in excess of eight hours a day should be presented to the Office for payment.

DIVISION OF DRAINAGE INVESTIGATIONS
S. H. McCrory, Chief.

Projects:

Administration

On October 1-2, S. H. McCrory was at Albuquerque, New Mexico, where he met D. E. Heizer, A.D.E., and arranged for future work in that section. From Albuquerque, they proceeded to Roswell, at which place they conferred with officials of the Roswell, Hagerman, and Dexter-Greenfield drainage districts. From Roswell, Mr. McCrory proceeded to San Antonio, Texas, where he met W. N. Hall, D.E. Among other matters attended to it was decided to discontinue the work in the Brownsville section for the present. Mr. Hall will spend some time in the vicinity

of Salt Lake City and later be transferred to the Berkeley office. On October 9 Mr. McCrory conferred with C. W. Okey, S.D.E., at New Orleans relative to work in Louisiana, Florida, and South Carolina.

Farm Drainage

J. R. Haswell, D.E., has been engaged part of the month on the Bureau of Animal Industry Farm at Beltsville. He also gave assistance to farmers in the vicinity of Baltimore and Annapolis.

Fred F. Shafer, D.E., left the Office the latter part of the month on an extended trip to render assistance to farmers in West Virginia, Kentucky, Indiana, and Tennessee.

H. M. Lynde, D. E., is at present in Missouri assisting farmers in the vicinity of Boonville and Carrollton in constructing terraces on their farms. Mr. Lynde will endeavor to construct several Mangum terraces for demonstration purposes.

Lewis A. Jones, D.E., during the month delivered addresses to farmers' meetings held under the direction of the Alabama Agricultural Experiment Station at Uniontown, Eutaw, Livingstone, Marion, Greensboro, Sylacauga, and Talladega.

The installation of the necessary machinery and the construction of the flume, etc., for experimental purposes on the Arlington farm are about completed, and it is hoped experiments can be started next week.

Reports Transmitted:

D 8X Farm Drainage in North Carolina, by H. M. Lynde, D.E.*
D 9 Gibson Farm, Charleston Co., S. C., by F. G. Eason, D.E.
D 9 Rice Farm, Colleton Co., S. C., by F. G. Eason, D.E.
D 24 Kentucky State Fair Grounds Farm, Jefferson Co., Ky., by Fred F. Shafer, D.E.
D 29 Lucy Farm, Hot Springs Co., Ark., by O. G. Baxter, D.E.
*Bulletin to be printed by North Carolina Department of Agriculture.

Reports Received:

D 8X Terracing in North Carolina, by F. R. Baker*
D 26B Holman Farm, Sumter Co., Alabama, by Lewis A. Jones, D.E.
D 29 Locke Farm, Little River Co., Arkansas, by O. G. Baxter, D.E.
D 61 Elderry Farm (progress) Montgomery Co., Alabama, by Lewis A. Jones, D.E.
*Assistant to H. M. Lynde furnished by the North Carolina Dept. of Agriculture.

Overflowed Lands

During the month O. G. Baxter has made a study of constructed drainage systems in Arkansas, particular attention having been given to the efficiency of the ditches.

D. L. Yarnell, D.E., who has been engaged on the Monona-Harrison Drainage District, Iowa, assisted by W. E. Comfort, C.E.S., has completed the field work. The latter has returned to the Washington Office where he will assist J. V. Phillips, D.E., in the preparation of the plans for the Panther Creek Drainage District, Kentucky. Before returning to the Office Mr. Yarnell will make a survey of a farm near East St. Louis and will also make an examination of conditions along the Cache River Drainage District near Metropolis, Illinois.

C. W. Okey and F. G. Eason are engaged in field work near Whitehall, S.C., collecting data to design a drainage system for some abandoned rice lands in that section. As there are considerable areas of such land in South Carolina and Georgia, this work is being done for demonstration purposes.

Lewis A. Jones, assisted by F. E. Staebner, C.E.S., has commenced a survey of the proposed Luxappolila River Drainage District, Alabama. At present they are operating from Millport.

Reports Transmitted:

D 15 Drainage in Southern Portion of Michigan, by A. D. Morehouse, D.E.
D 24 Cypress Creek Drainage District, McLean and Muhlenberg Counties, Kentucky, by Fred F. Shafer and D. F. Culbertson.
D 26 Letobatchee Creek, Lowndes County, Alabama, by Lewis A. Jones.

Reports Received:

D 9 Catfish Drainage District, Marion and Dillons County, S. C., by F. G. Eason.
D 29 Curia Creek Drainage District Levees, Independence Co., Ark., by O. G. Baxter.
D 29 Inspection of Drainage Ditches, District No. 9, Mississippi Co., Ark., by O. G. Baxter.

Irrigated Lands

W. N. Hall, D.E., has submitted a manuscript on Drainage in the Lower Rio Grande Valley of Texas, which will probably be published as a bulletin. The report represents the observations and investigations of Mr. Hall since he was stationed there in 1911.

Guy A. Hart, A.D.E., has been engaged during the month on a survey of the French Prairie Drainage District, Oregon.

D. E. Heizer, A.D.E., after inspecting conditions in New Mexico and the Las Animas Drainage District, Colorado, has returned to Wyoming to complete work near Worland and Manderson.

W. W. Weir, D.E., on October 8, addressed a number of land owners at Live Oak, California.

Reports Transmitted:

D 36 I Lennox Tract, near La Junta, Colorado, by L. T. Jessup, A.D.E.

Reports Received:

D 39 A South Delta Tract, Millard County, Utah, by R. A. Hart, D.E.
D 43 Drainage Situation in Owen River Valley, California, by W. W. Weir.

Peat, Turf, and Muck Investigations

J. R. Haswell has submitted a report of his investigations on this subject in New York and New Jersey. C. W. Okey has also submitted his report on the contraction of muck lands after drainage.

DIVISION OF IRRIGATION INVESTIGATIONS
Samuel Fortier, Chief.

Projects:

Administration

Papers are now being graded by the Civil Service Commission from the examination held in September for Assistant Irrigation Engineer. It is expected that several appointments will be made as soon as the eligible list is compiled. Pending certification of eligibles by the Commission, Raymong Richards, formerly an employee of the Geological Survey, is being employed temporarily in Washington, as assistant in the work of computing the results obtained in the field work on flow of water in wood pipes.

Representatives of the Irrigation Division in California are now completing the last of a series of studies generally outlined five years ago. This series has included cooperative duty of water experiments at the University Farm at Davis, a study of the irrigation resources of California, the installation and testing under field conditions of standard irrigation measuring devices, a study of irrigation in the Sierra Nevada foothills, a study of the mutual water companies of southern California, a study of California irrigation districts, and a study of the duty of water for alfalfa in the Sacramento and Imperial valleys. Reports have been published or are now ready for publication covering all of these studies except the two dealing with mutual water companies in southern California, and the duty of water for alfalfa. Reports will be completed covering these before the beginning of next season. The main new work now being planned for the California field is a study of orchard irrigation. F. W. Adams, I.E., who has been in charge of the California field, spent the last 10 days of the month in the Washington Office for consultation regarding a possible reorganization of future work in California.

Use of Water

Plane table surveys have been started in the sections in Wyoming where investigations of the use of water were carried on during the irrigation season just closing, under the direction of J. T. Kingdon, I.E. These sections lie in the valleys of Owl Creek, near Thermopolis, Little Goose Creek, near Sheridan, and La Prele Creek, near Douglas. The survey on Owl Creek involves a narrow strip about ten miles long on each side of the creek, through which ten or a dozen ditches carry water from the stream. The problems being studied on La Prele Creek involve two kinds of water rights. These are the early rights to direct diversion from the stream and the later rights to the use of stored water in La Prele reservoir. The custom in vogue on La Prele Creek in the apportionment of water is to store the surplus or unused flow outside the irrigation season and, during the period when water is required by ditches entitled to direct flow of the creek, water is permitted to be discharged from the reservoir. In addition to this discharge from the reservoir, water is supplied to the cansls dependent on storage waters.

Memoranda of agreement between this Office and the Board of Water Engineers of Texas have been signed, and work under it is being started. The agreement provides for investigations of seepage losses in canals, determinations of the quantity of water required for the irrigation of staple crops on different types of soil, determinations of the proper rate of application of water to different types of soil to secure a proper distribution of moisture in the soil, and studies of the effect of cultural methods on quantity of water required to maintain proper soil-moisture conditions in different types of soil. Present experiments have to do with the winter irrigation of truck crops.

R. G. Hemphill, I.F., has submitted a report on conditions in the Cache la Poudre Valley, Colorado, which is to be used for reference in connection with a suggested new line of work to be undertaken in that valley in use of water. Recent statistics show the irrigation of about 275,000 acres by direct diversion from the stream and the irrigation of about 75,000 by stored water, from 65 to 75 ditches now operating in the valley. Mr. Hemphill suggests that if the work be taken up it should include particularly measurements of water in the river, at the heads of the canals, at the heads of laterals, and at farm turn-outs for the farm as a whole and for single crops, with measurements also of inflow and outflow from reservoirs. Economic studies are suggested, these to include engineering design and construction, water rights, etc.

Laws, Customs, and Regulations

While in Washington Frank Adams, I.M., submitted for examination his report on Irrigation Districts in California, covering historical and economic features of this form of irrigation development in that State. This report has been approved by the Director and will be published by the State Engineer.

Development of Equipment

V. M. Cone, I.E., has submitted manuscript of a report on calibration tests of the Dethridge meter, which have been conducted at the Fort Collins laboratory. This is to be published by the Colorado Station, if approved by the Director.

Measurement of Water

V. M. Cone has been making tests at the Ft. Collins hydraulic laboratory on a device for measuring the flow of canals, which he has designed and has called the Venturi flume. This name is used because the principle involved in this device is somewhat similar to that of the Venturi meter. The flume is a structure for narrowing the channel of the canal so as to form a throat, and the discharge is determined from the difference in the elevation of the water surfaces above and below the throat.